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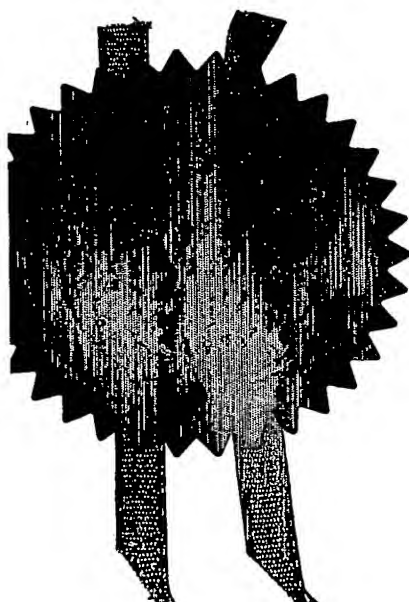
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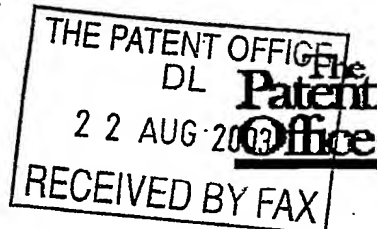
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1. Your reference

02.057-ipw/ph

2. Patent application number

(The Patent Office will fill in this part)

0319769.6

22 AUG 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

IPWireless, Inc.
1001 Bayhill Drive, 2nd Floor
San Bruno, California
CA 94088

Patents ADP number (if you know it)

8169401002

If the applicant is a corporate body, give the country/state of its incorporation

USA, Delaware

4. Title of the invention

HOLDER FOR MODULE AND METHOD THEREFOR

5. Name of your agent (if you have one)

Peter Hudson

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

InetIP
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Hampshire GU34 5DJ

Patents ADP number (if you know it)

7928757001

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Country

Priority application number
(if you know it)Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if

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a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or

c) any named applicant is a corporate body.

See note (d)

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Continuation sheets of this form

Description	8
Claim(s)	4
Abstract	1 <i>DL</i>
Drawing(s)	3 <i>only</i>

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)Request for preliminary examination and search (*Patents Form 9/77*)Request for substantive examination (*Patents Form 10/77*)Any other documents
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11. I/We request the grant of a patent on the basis of this application.

Signature

Date

Peter L. Hudson

22 August 2003

12. Name and daytime telephone number of person to contact in the United Kingdom

Peter Hudson

01420 562568

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DUPLICATE

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HOLDER FOR MODULE AND METHOD THEREFOR**Field of the Invention**

5

This invention relates to modules and their incorporation and related testing capabilities in electronic equipment. The invention is applicable particularly, though not exclusively, to electronic modules such as SIM

10 (Subscriber Identity Module) or USIM (Universal SIM) cards in communication equipment.

Background of the Invention

15

In the field of this invention it is known in an ideal manufacturing environment, a high volume product is manufactured from all of its component parts into its final enclosure, boxed and shipped. Due to practical

20 yield issues, testing is required at some stage to ensure that only operational product is boxed and shipped to the end user.

Ideally, testing is performed using only the interfaces

25 that are physically available on the final finished product, denying test interface access to the user, maintaining product aesthetics, minimising overall cost and complexity. This makes conventional automated testing, which often ideally requires test probe access

30 to electronic circuitry within the enclosure of the finished product, virtually impossible.

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Devices that conform to first, second and third generation mobile phone standards should incorporate a user-removable SIM or USIM card. This card is relatively large (around 15mm x 25mm x 1.2mm), and when inserted into a mobile phone, generally locates in/on to a flat surface of similar size and is held there by a variety of low cost methods.

- 10 Low cost, high volume designs (e.g., for consumer communication devices) utilise self-contained SIM card holders that mount on the electronic printed circuit board (PCB) of the device, or use a device surface plus features of the device enclosure to hold the (U)SIM card with minimal cost. In each approach, the (U)SIM card is physically separated from the electronic printed circuit board by a protective uniform insulating surface.

20 However, this approach has the disadvantage(s) that such known (U)SIM holder designs obscure portions of the printed circuit board on which they are mounted, denying test access to large areas of of the PCB.

25 A need therefore exists for a holder for an electronic module and method therefor wherein the abovementioned disadvantage(s) may be alleviated.

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Statement of Invention

In accordance with a first aspect of the present invention there is provided a holder for an electronic
5 module as claimed in claim 1.

In accordance with a second aspect of the present invention there is provided a method of assembling a holder for an electronic module as claimed in claim 11.

10

Briefly stated, in a preferred embodiment, the present invention provides a (U)SIM card holder that is modified with a number of drilled holes that allow conventional test probe access for conventional probe test equipment
15 to access standard surface mount test probe pads on a PCB.

Whilst the invention relates to all self-contained (U)SIM card holders (lidded or un-lidded), it is equally
20 applicable to (U)SIM card holders that use a device PCB surface plus features of the device enclosure to hold the (U)SIM card.

Preferably, although not necessary in all device designs,
25 metal plating of the surface in which the (U)SIM holder holes are drilled, is provided, as this is a desirable extra feature that makes the invention applicable to a wider range of devices.

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Brief Description of the Drawing(s)

One holder for (U)SIM cards and method therefor
incorporating the present invention will now be
5 described, by way of example only, with reference to the
accompanying drawing(s), in which:

FIG. 1 shows a perspective view of a (U)SIM card
holder for consumer communications devices;

10

FIG. 2 shows a perspective view of the holder of
FIG. 1 mounted on a printed circuit board of a
portable wireless modem and undergoing testing; and

15

FIG. 3 shows a perspective view of the (U)SIM card
holder of FIG. 1 mounted on the printed circuit
board and with a (U)SIM card mounted inserted in the
holder after completion of testing as in FIG. 2.

20

Description of Preferred Embodiment(s)

Referring firstly to FIG. 1 and FIG. 2, a (U)SIM card
holder 100 for a wireless communication equipment
25 portable modem is made of moulded plastic material in the
general form of a frame or tray defining a shallow recess
110 for insertion of a (U)SIM card (described below). The
holder 100 has a rectangular aperture 120 therethrough
for allowing the inserted (U)SIM to make contact with a
30 printed circuit board (PCB) 140, using a standard sprung
connector (not shown), described below, on which the

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holder is to be mounted. The holder 100 also has eighteen 1.0mm diameter circular drilled/moulded holes 130 in the bottom plastic (U)SIM holder surface. At one side of the recess 110, the card 100 has a through slot 100'.

5

The holes 130 align with eighteen surface mount test pads (not shown), located on the PCB 140 on which the tray 100 is mounted, that are the standard minimum 0.8mm in diameter and are located on the standard minimum 2.14mm test probe pitch.

It will be understood that FIG. 1 depicts a "lowest cost of ownership" example, and that the invention more generally is not dependent on any standard test probe diameter, test fixture probe pitch, PCB test pad diameter or number of holes drilled.

A standard test fixture may be populated with eighteen standard test probe pins (one of which, 150, is shown) that align with the holes in the (U)SIM tray 100, using locating features (not shown) elsewhere on the device enclosure. When activated, a standard test fixture generally pushes spring-loaded test probes such as the probe 150 through the holes 130 and onto the pads on the printed circuit board below, enabling access to the electronics of the unit under test from the test equipment.

Referring now also to FIG. 3, the holes 130 in the (U)SIM holder 100 are visible at all times until the user inserts the (U)SIM card 160 (by inserting an edge portion

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160' - shown in dotted line - of the card through the slot 100'); this action is required to enable standard operation of the device. When inserted, the (U)SIM card 160 covers the holes 130 from sight and protects them and the PCB pads below them from moisture, dirt and any electrostatic discharge (ESD) the device design may allow.

It will be understood that any number of holes/pads/probes may be implemented in the space specifically available in the desired implementation, dependent on the number of electronic test points that need to be accessed. It will also be understood that either surface mount (SMT, as shown FIG. 1), plated through hole (PTH) or interference fit of stand-alone (U)SIM holder designs may be used.

It will further be understood that the (U)SIM holder and method described above allows test access with zero added component cost or degradation of the aesthetics of the device in its final usable form. Location of surface mount test pads on the PCB and the moulding of a modified SIM holder or enclosure surface with this type of hole may be implemented using standard moulding practice and carries no cost penalty.

In the example surface mount implementation of FIG. 1, a masked plating operation is performed on the underside (not visible in the orientation shown in FIG. 1) of the (U)SIM holder to plate metal onto the surface mounting pads. By correctly designing the plating mask, the entire

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under surface of the SIM holder can be plated to allow shielding for Electro Magnetic Interference (EMI) energy, commonly emitted from electronic components when active, as well as plating the mounting pads.

5

By designing a plated (U)SIM holder in this way, or adding a plated (U)SIM location surface (used with features of the device enclosure to hold the (U)SIM card, i.e., plating the legs), and connecting the plated area
10 to the relevant ground of the modem device, electro-static discharge (ESD) protection may be afforded (in conjunction with device enclosure design for ESD) for each pad accessible through the holes in the (U)SIM
holder at zero cost. This is possible as ESD energy may
15 travel through the low impedance metal plated area to ground, in preference to travelling through any SMT test pad to ground. It will be appreciated that since it will typically be necessary to plate multiple surface mount
feet (not shown) on the underside of the holder 160, by
20 creating the appropriate sort of plating mask one can plate the entire bottom surface at no significant increase in cost or processing time.

By designing the metal plating mask to create a minimal
25 clearance between the (U)SIM holder hole edge to the plating area, short-circuit of the test probe pins through the metal plating area is avoided.

By designing the metal plating mask to connect any or all
30 surface mount pads to the underside (or any or all other surfaces) of the (U)SIM holder, desirable mechanical

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contact can be achieved with any EMI-shielding surface designed into the device enclosure (not shown).

It will be understood that the holder for an electronic module and method therefor described above provides the advantage of simple and effective PCB testing before (U)SIM insertion, which may be used with standard fixtures, at no additional cost. It will also be appreciated that effective PCB testing after (U)SIM card insertion in a fully assembled device is also facilitated since the testing can be conducted by probing directly through the holder 100 upon removal of the card 160.

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Claim(s)

1. A holder for a module for connection to a circuit in electronic equipment, the holder being arranged to
5 receive the electronic module and having a portion provided with at least one hole therethrough,
wherein the at least one hole is arranged to provide access through the holder to the circuit for testing.
- 10 2. The holder of claim 1 wherein the at least one hole is arranged to be covered by the electronic module when positioned in the holder.
3. The holder of claim 1 or 2 wherein the holder is
15 provided with a plurality of holes therethrough.
4. The holder of claim 1, 2 or 3 wherein the holder is arranged to be mounted on the circuit by one of A-B:
A surface mount technology,
20 B plated through hole technology.
5. The holder of any preceding claim wherein the holder is further provided with a conductive layer on a surface for positioning adjacent the circuit.
25
6. The holder of any preceding claim wherein the module comprises a subscriber identification module.
7. The holder of any preceding claim wherein the
30 electronic equipment comprises wireless communication equipment.

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8. The holder of any preceding claim wherein the wireless communication equipment comprises a portable modem.

5

9. The holder of any preceding claim wherein the circuit is provided in a printed circuit board.

10. The holder of any preceding claim wherein the holder
10 is of moulded plastics material.

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11. A method of assembling a holder for a module on a circuit for electronic equipment, the method comprising:
providing a circuit;
providing a holder for a module for connection
5 to the circuit, the holder being arranged to receive the electronic module and having a portion provided with at least one hole therethrough; and
mounting the holder on the circuit.
- 10 12. The method of claim 11 further comprising inserting the module in the holder such that the at least one hole is covered by the electronic module.
13. The method of claim 11 or 12 wherein the holder is
15 provided with a plurality of holes therethrough.
14. The method of claim 11, 12 or 13 wherein the step of mounting comprises mounting the module on the circuit by one of A-B:
20 A surface mount technology,
B plated through hole technology.
15. The method of any one of claims 11-14 wherein the holder is further provided with a conductive layer on a
25 surface positioned adjacent the circuit.
16. The method of any one of claims 11-15 wherein the module comprises a subscriber identification module.

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17. The method of any one of claims 11-16 wherein the electronic equipment comprises wireless communication equipment.
- 5 18. The method of any one of claims 11-17 wherein the wireless communication equipment comprises a portable modem.
19. The method of any one of claims 11-18 wherein the
10 circuit is provided in a printed circuit board.
20. The method of any preceding claim wherein the holder is moulded of plastics material.
- 15 21 A method of testing comprising the method of assembling a holder for a module on a circuit for electronic equipment as claimed in any one of claims 11-20, and ; and testing the circuit through the at least one hole.
- 20 22. An electronic circuit having mounted thereon the holder of any one of claims 1-10.
23. A holder for a module for connection to a circuit in
25 electronic equipment substantially as hereinbefore described with reference to the accompanying drawings.
24. A method of of assembling a holder for a module on a circuit for electronic equipment substantially as
30 hereinbefore described with reference to the accompanying drawings.

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AbstractHOLDER FOR ELECTRONIC MODULE AND METHOD THEREFOR

5 In a holder (100) for an electronic module such as a SIM
card (160), and method therefor, for connecting the
electronic module to a printed circuit board (PCB, 140)
in electronic equipment, the holder has a portion
provided with at least one hole therethrough (130). The
10 or each hole is arranged to provide access through the
holder to the PCB for testing, and arranged to be covered
by the electronic module when positioned in the holder.
This provides the advantages of simple and effective PCB
testing before SIM insertion, which may be used with
15 standard fixtures, at no additional cost.

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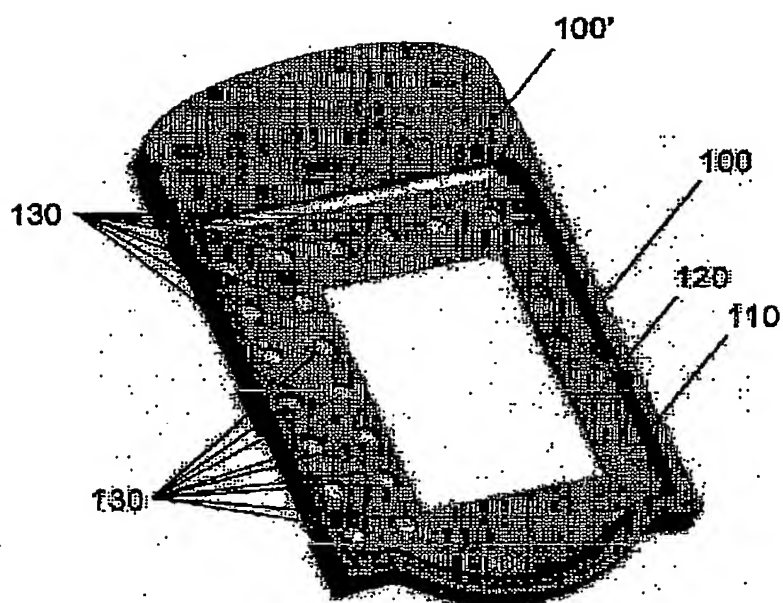


FIG. 1

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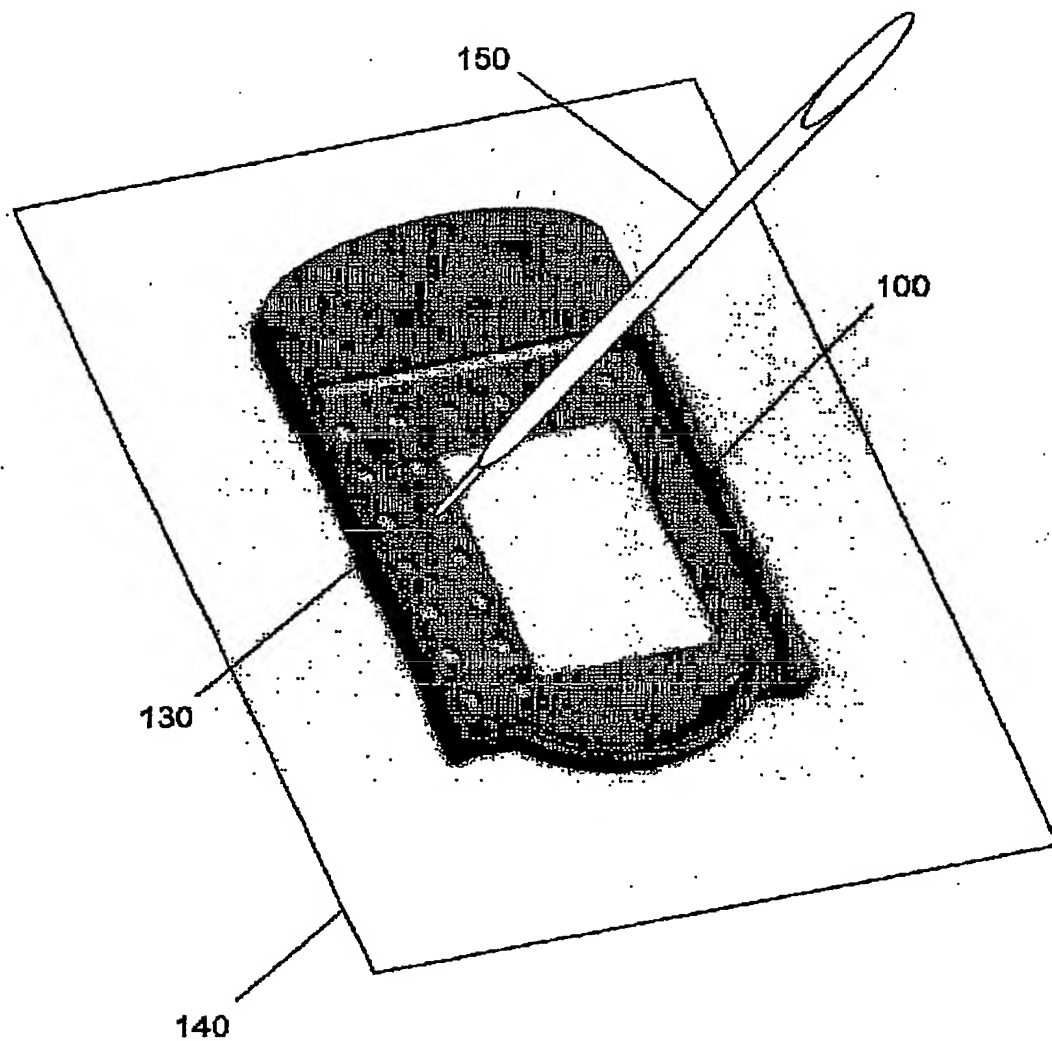


FIG. 2

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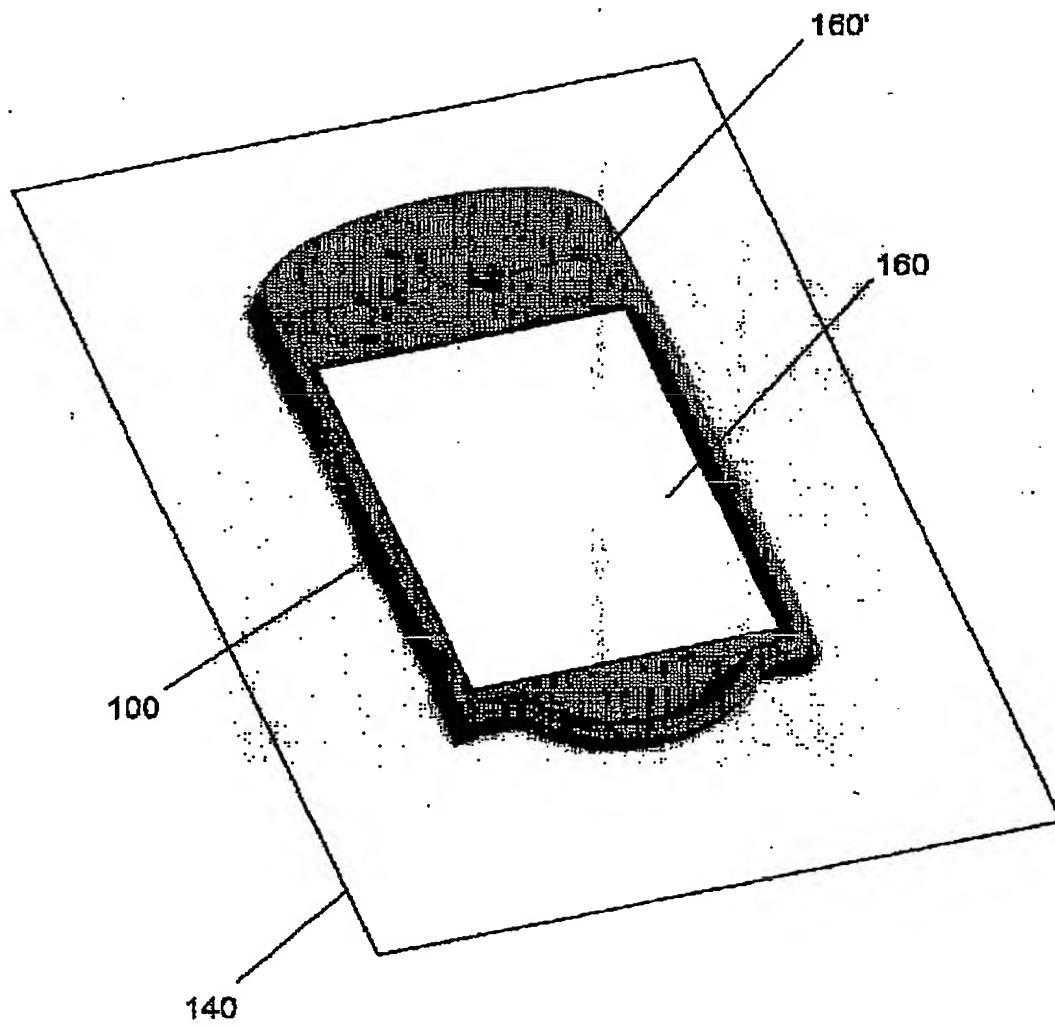


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